FAA AVIATION NEWS

NOVEMBER 1969

COVER

FAA's proposed terminal control areas will be open to general aviation aircraft of all types provided that they are suitably equipped with appropriate avionics. For details on the new plan, see page 4.

FAA AVIATION NEWS

DEPARTMENT OF TRANSPORTATION / **FEDERAL AVIATION ADMINISTRATION** VOL. 8, NO. 7

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OUT IN THE COLD

AIRPLANES, like people, can catch cold. Nippy weather can change the flight characteristics of parked aircraft and can also cause hidden, cold-induced damage that could result in costly repairs and create hazards to flight.

Winter is not necessarily the enemy of airmen. Cold weather operations can be just as safe as flying at any other season of the year. All that is needed is a basic understanding of the effect of low temperatures on the assemblage of fluids, metals, hoses, gaskets and electrical components that lie beneath the gleaming skin of your airplane —and the pilot's initiative to take a few practical precautions.

In areas where the mercury dips to 32° or lower, a heated hangar is obviously the best place for a plane to hibernate between flights.

Even an unheated hangar or similar shelter will contribute to safety and the mechanical well-being of the aircraft by protecting it from corrosion and ice and snow accumulation.

A shelter also makes routine maintenance and preflight inspections more convenient and comfortable, a circumstance that contributes to safety. When fingers are not numbed, oil level can be checked, sumps drained and a thorough external inspection of the plane can be made in comfort.

However, most general aviation aircraft spend the winter tethered outdoors, subject to broad temperature changes, rain, frost and snow.

A qualified A&P, familiar with local winter conditions, should be consulted before purchasing an engine winterization kit. Sometimes called "winter fronts," these cover up or restrict the air flow over cylinders and oil coolers. Considering local prevailing temperatures, perhaps none will be needed and an unnecessary expense avoided.

Only kits supplied or recommended by the engine or airplane manufacturer should be installed because unsuitable kits can result in engine damage, and possible invalidation of the manufacturer's warranty.

If the engine is "winterized" a cylinder-head temperature gauge should be installed.

Homemade kits must be approved on an individual basis by FAA, as they constitute a modification affecting safety in flight.

Batteries, both wet and dry cell, should be protected from extreme cold. A wet cell battery is surprisingly robust—provided it is kept at a high state of charge. A fully charged (specific gravity of 1.275 to 1.300) wet cell battery is capable of withstanding temperatures as low as minus 61° F, whereas a fully discharged (sg. 1.100) wet cell battery will freeze at 19°F.

If the aircraft is to be left outside during the winter the battery should be removed and stored in a warm, dry place. Before being reinstalled it should be fully recharged at the rate of charge specified by the manufacturer. *Applying a high charge to a frozen battery might explode it, spraying harmful sulphuric acid on bystanders.*

Engine rust in aircraft idle for long periods of time is easily prevented by running the engine for a few minutes every other week. This will circulate the oil, depositing a thin film on moving parts and cylinder walls. For extended storage, the cylinders should be sprayed by a qualified mechanic. Before starting, the engine should be pulled through by hand several times with *fuel and ignition switches off.*

Cold contracts materials, thereby affecting hoses, gaskets and even the rigging of the airplane. Cracked, checked, dried, and weakened hoses should be replaced. Torque values on fastenings for flexible tubing, seals and other fittings should be checked, using a torque wrench and not a "by gosh and by guess" sense of feeling. This is work for an A&P.

Control cable tension should also be checked by an A&P for winter conditions. In cold weather, the aluminum alloys that make up most of an aircraft's structure contract at a different rate than the steel control cables. This difference could affect the response of the controls by making the cables too loose or too tight.

Airplanes destined to spend the winter outdoors should be carefully sealed to prevent wind-blown snow from entering the fuselage. Snow entering the fuselage will eventually melt in the spring thaw and the resulting water can set up conditions suitable for corrosion and rot.

Water sloshing around inside the fuselage could also saturate electrical systems and short out a system in flight. Before flight, all drifted snow should be carefully swept from the aircraft interior. A plastic or light canvas cover for the windshield and engine will provide protection and will make preparation for flight simpler and safer.

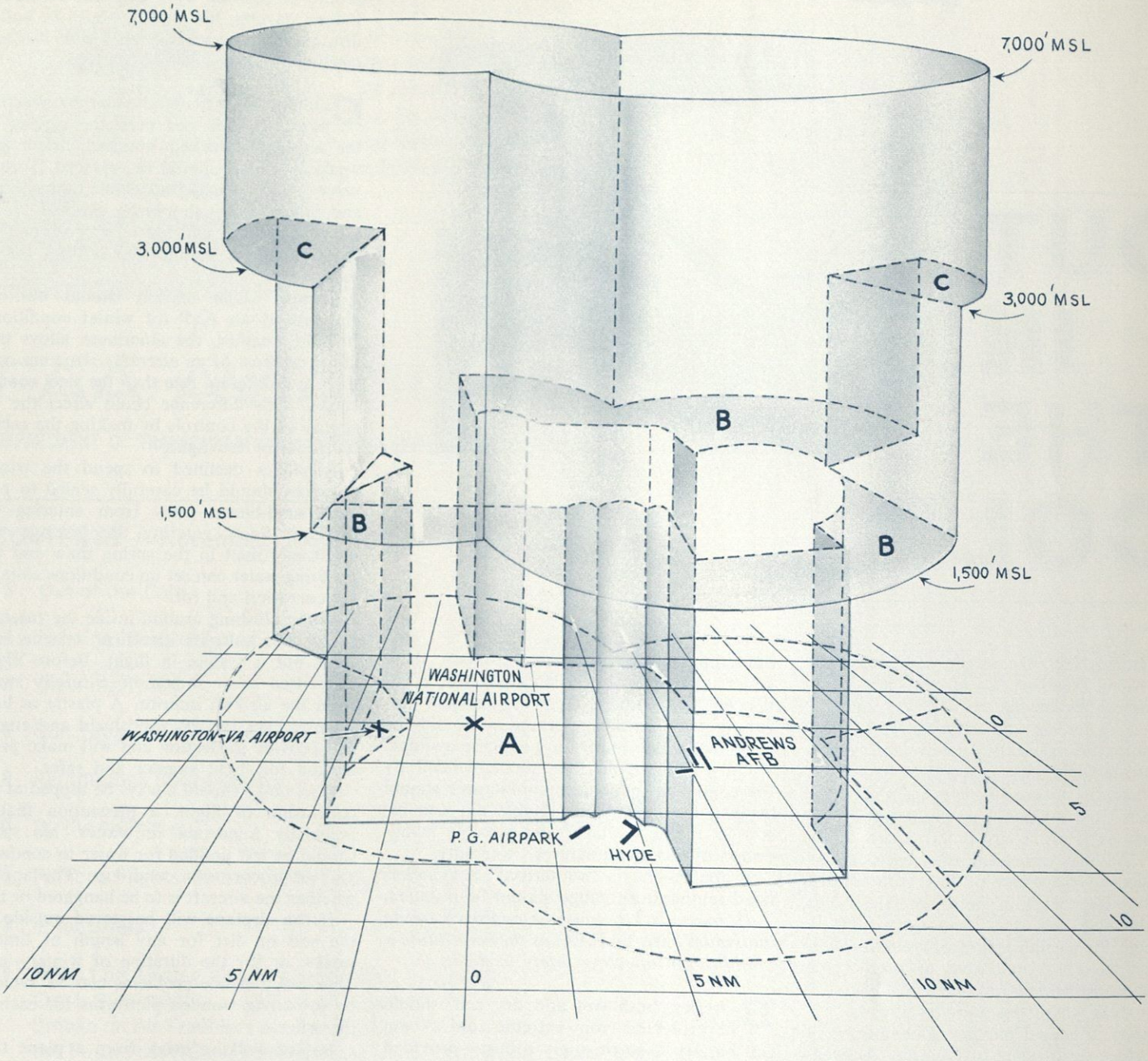
Fuel tanks should always be topped at the conclusion of flight, a precaution that is especially important in winter. No space should be left unfilled for water to condense and set up corrosion conditions. This applies whether the aircraft is to be hangared or not.

If the airplane will be stored outside on the sod or dirt for any length of time—weeks, or for the duration of winter—possible maintenance problems can be avoided by providing wooden platforms for each of the wheels.

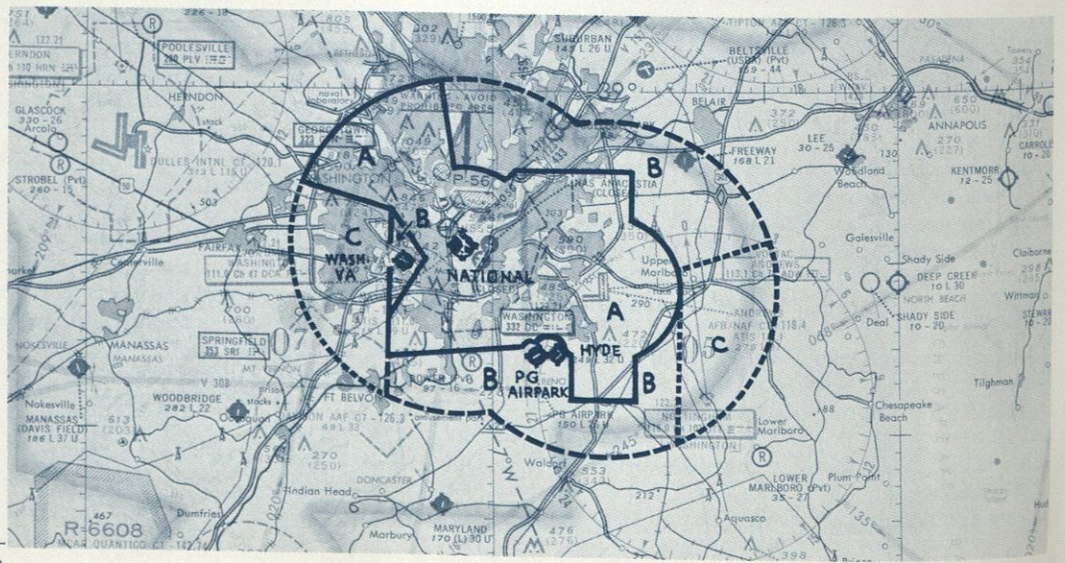
Before walking away from a plane that will spend the winter outside, remove all easily stowable gear such as portable radios, navigation kits, charts, microphones, etc., to discourage casual larceny. Controls should be locked and the aircraft tied down according to manufacturer's instructions (or according to FAA Advisory Circular AC 20-35A, "Tie-Down Sense," available free from the Department of Transportation Distribution Unit, TAD-484.3, 800 Independence Ave. S.W., Washington, D.C. 20590).

Despite its light weight in proportion to its bulk, an aircraft is a remarkably rugged machine. It is designed to operate in extremes of weather, and it can easily survive the winter in outdoor storage with only a little special effort on the part of the owner, as soon as the leaves begin to fall.

Just don't put it off until they all come down. ■



Isometric view (above) of diagram on chart (right) shows how new terminal control area would apply to the airspace around Washington National Airport and nearby Andrews AFB. The solid line shows how free access would be provided for use of the three smaller airports close to downtown Washington — Washington / Virginia, Prince Georges Airpark, and Hyde Field.



MAP LEGEND

- General Aviation Airports
- Major Airports
- Surface Boundary
- Upper Boundary

TERMINAL CONTROL AREAS

Positive control at major airports would retain accessibility to general aviation

The Federal Aviation Administration is now studying comments from the aviation industry on a proposed rule (Notice 69-41, Docket No. 9880) that would place all aircraft operating in designated airspace surrounding certain busy airports under the control of air traffic facilities, thus reducing the potential for midair and near midair collisions.

The proposal would establish "terminal control areas" around the nation's major airports and require all aircraft operating in these designated areas to meet certain equipment requirements and follow prescribed flight procedures. Air traffic control (ATC) would provide separation for all aircraft, both VFR and IFR, operating within the terminal control area.

The proposed rule is designed to reduce the midair collision potential around major airports by eliminating "unknown" traffic from the terminal airspace environment.

Minimum equipment required for all aircraft flying into designated terminal control areas under the proposal are: (1) a two-way radio, (2) VHF (very high frequency) navigation equipment, and (3) a 64-code radar beacon transponder. The two-way radio is already required for aircraft using airports served by an FAA control tower. The transponder is not required except during published hours.

New procedures to be established by the terminal control area rule include: (1) mandatory air traffic control clearance for all aircraft before entering the designated area, (2) specific entry points and altitudes for VFR aircraft, (3) a ban on student pilots landing or taking off from an airport within a terminal control area, (4) a ban on VFR operations when the cloud ceiling at the primary airport in the control area is less than 1,500 feet, and (5) a 200-knot speed limit on all aircraft operating in the airspace underlying the area.

Not a Stopgap Measure

The terminal control area concept is the culmination of months of effort on the part of Government and industry to improve the airspace environment around major terminals. FAA Administrator John H. Shaffer emphasized that "This is not a stopgap measure hurried through as a result of any single air disaster, but rather a carefully considered element in an orderly progression of change."

If the rule is adopted, FAA plans to put it into effect at 22 locations, beginning with an area encompassing Washington National Airport and Andrews Air Force Base. The other terminal areas would be Atlanta, Boston, Chicago O'Hare, Cincinnati, Cleveland, Dallas, Denver, Detroit, Houston, Kansas City, Las Vegas, Los Angeles, Miami, Minneapolis, New Orleans, New York complex (La Guardia, Kennedy, Newark), Philadelphia, Pittsburgh, St. Louis, San Francisco, and Seattle.

Individual Notices of Proposed Rulemaking concerning the establishment of terminal control areas in these cities will be issued shortly.

The configuration of each terminal control area would differ according to the actual airspace needs in each case. In general the area would be shaped in the form of an inverted two-layer cake, with the upper layer extending further laterally and with indentations where required to accommodate local conditions.

Washington/Andrews Example

The proposed terminal control area for Washington National Airport/Andrews Air Force Base, for example, would have a bottom layer that would extend laterally from five to ten miles from both airports and vertically from ground level to 1,500 feet. Airspace would be provided to allow free access to the three general aviation airports close to downtown Washington, D.C. — Washington / Virginia, Prince Georges Airpark and Hyde Field. Rectangular corridors would project from the low altitude area to accommodate traffic arriving or departing the two major airports.

The upper level would extend upward to 7,000 feet within the 10-mile radii of Washington National Airport and the Andrews VORTAC. Two recessed sections between 1,500 feet and 3,000 feet would provide operating latitude for uncontrolled aircraft outside of the approach/departure corridors for the major airports.

FAA is also currently preparing proposed rulemaking designed to reduce the collision potential at all other airports where turbine-powered air carrier aircraft operate. The operating and equipment requirements for these airports will be covered in a subsequent notice of proposed rulemaking for the following two categories of airports:

(1) Airports with FAA radar-equipped control tower. There are 97 airports in this category, and these would have a terminal airspace configuration similar to those provided at the 22 major hubs cited above.

(2) All other airports accommodating turbine-powered air carriers. Special arrival and departure corridors will be designated in the available airspace.

Establishing terminal control areas around major airports was one of the key recommendations of the year-long DOT/FAA Near Midair Collision Report of 1968, published in July of this year. The report showed that approximately two-thirds of all "hazardous" near midair collisions occur in terminal airspace. Two of the chief causes were identified as the uncontrolled mixture of VFR and IFR traffic, and the difficulty of maintaining separation on a "see and be seen" basis. ■

Warming Trend

Old airplane sayings, like old wives tales, never seem to wear out. Take the one that admonishes pilots to make sure their engine is fully "warmed up" before taking off. A cold engine may conk out on takeoff when you need it most, the story goes, so be sure to warm it up. This warning had a measure of truth back in the early history of aviation, when poor ignition, poor fuel, or unsophisticated engine design led to frequent engine failure.

But today, it is hazardous to operate the typical "flat-six" air-cooled engine used to power modern light planes for extended periods on the ground. Unless the weather is very cold, the time needed to taxi to an assigned takeoff runway is generally sufficient to bring the engine to optimum operating temperature. (This does not apply to the relatively few radial engines, used mainly in agricultural and antique aircraft, or liquid-cooled engines in vintage WW II planes.)

The exact ground running time recommended for a particular engine at a specific ambient temperature can be obtained from the engine manufacturer. Factors to be considered, in addition to prevailing ground temperature, are cowl flaps and high crankshaft/propeller shaft gear ratio. Either of these can cause the engine to run at a dangerously high temperature after only a short period of operation on the ground.

The problem arises because modern engines may be said to be streamlined "to a fault." Furthermore, while a sleek cowling enclosing the engine reduces the overall drag, the fit is so snug that it often restricts the amount of cooling air which reaches the last two cylinders on each side of the crankcase, when the engine is operated on the ground with the plane stationary.

Heat is the Energy

Ram air is needed to permit a sufficiently cooling draft of air to reach all cylinders, and this is achieved only when the aircraft is in its natural element, cruising through the skies. Prolonged runups on the ground may overheat the aft cylinders.

The penalty for excessive heating is varied, but in all cases it is expensive. High cylinder head temperatures can be expected to produce scored cylinders and broken rings, which could lead to the total destruction of the engine. This can occur on the ground during runups, or soon after takeoff when a sudden rush of cool ram air causes the overheated rear cylinders to cool rapidly. The hot cylinder barrels, cooling faster than the pistons, could cause the pistons to seize, resulting in an emergency landing or a serious accident.

Prolonged ground running of a tightly cowled in-line engine can ruin it.

One of the chief reasons for running an aircraft engine for any length of time on the ground in the "old days" was uneven quality and performance of lubricating oils. This is no longer valid because of the ready availability of a wide variety of high quality aircraft lubricants—if an owner or operator sticks to the engine manufacturer's recommendations he can expect trouble-free performance.

How is a pilot to know when his aircraft is safe to take off? Normally, the engine is ready to go when it will accept a steady throttle advance without hesitation while the oil pressure remains steady. If the aircraft is equipped with cylinder head temperature gauges, the aircraft manual will indicate approved operating ranges.

For most general aviation aircraft, ground power checks, including carburetor heat, magnetos and propellers should be done at about 1,700 rpm, unless otherwise stated by the aircraft or engine manufacturer. In order to take advantage of all possible cooling, the runup should be done facing into the wind.

Fast Climb Best

To avoid engine damage due to foreign objects, carburetor heat should never be used while taxiing or during extended ground runup. With carburetor heat on, the in-rushing air bypasses the filter and enters the engine directly, bringing with it abrasive particles. Carburetor heat should be checked immediately before takeoff with the aircraft on a paved surface or sod—never on sand.

On tightly cowled aircraft, the cooling effect of ram air is also restricted during takeoff and climb, even though the plane is moving through the air. Improved engine performance can be gained by climbing out with the fuel mixture in full rich. The evaporation of the extra fuel has a cooling effect on the engine, which is lost if the mixture is leaned out too soon.

For best engine cooling, the climb out speed should be consistent with the aircraft's best rate of climb—by climbing at a high rate of speed, engine cooling will be more effective. A long slow climbout, with lean mixture, will tend to overheat the engine and could cause internal damage.

The cooling efficiency of the engine can be affected by factors other than pilot manipulation. Cooling fins broken from cylinders, missing or bent baffle plates, or gross dents in the cowling can result in dangerously high operating temperatures, even during flight. Visual inspection of the engine should catch these deficiencies.

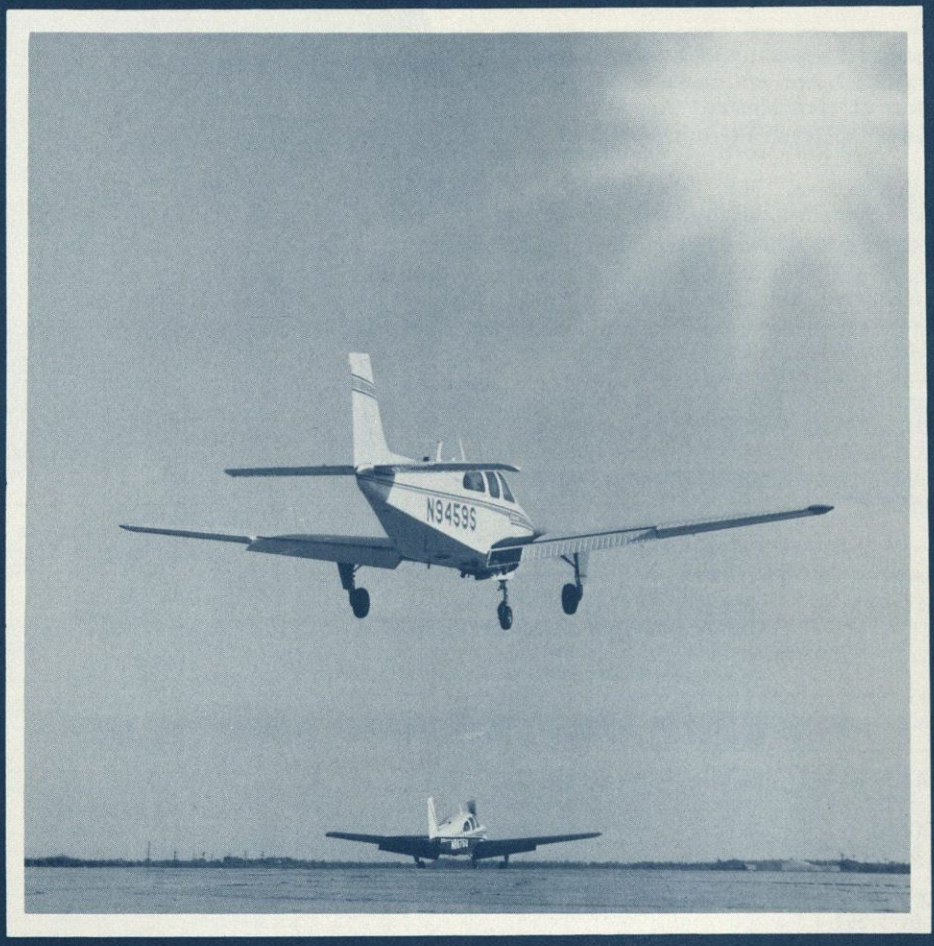
Modern aircraft engines are sophisticated, well-engineered machines that do not require "babying" under normal circumstances. They function best at altitude, and the sooner they level off "upstairs" the better they like it. Prolonged warmups and shallow climbouts are for the older generation.

Frank J. Clifford

BLIND SPOTS 1

A new series of articles designed to familiarize pilots with environmental conditions that affect vision from the cockpit.

SUN GLARE

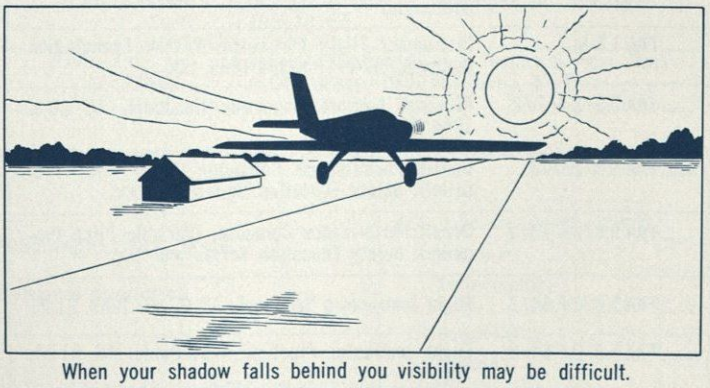


SUN GLARE. Flying against the sun, when it is low on the horizon, can block out a high percentage of normal cockpit visibility, especially in the presence of atmospheric debris (dust, haze, smoke, etc.) This can be particularly hazardous when flying in or out of airports and in areas of heavy traffic.

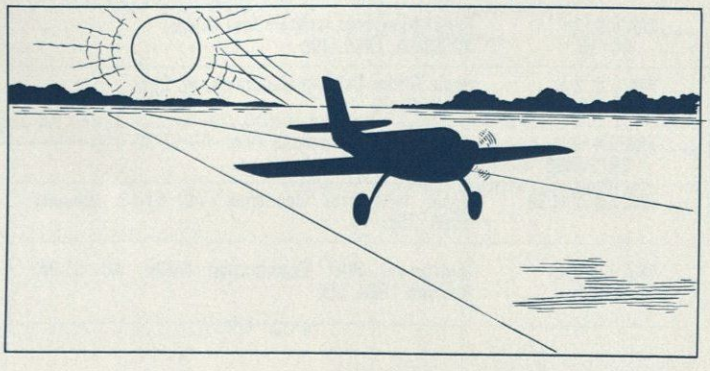
Under unfavorable circumstances, some runway surfaces may reflect sun glare in a manner that will seriously interfere with forward vision, perhaps blotting out wires or other obstructions. On takeoff, pilots flying directly into the sun may find it necessary, in order to maintain proper control of the aircraft, to rely on flight instruments, if trained to do so, or to watch the angle formed by the wing tip and the ground, or horizon.

Remedy: Plan to fly *with* the sun, if at all possible. When westbound, start your flying early and set down by midafternoon. Start later in the morning when eastbound and fly until sundown.

Pilots operating with the sun behind them during midafternoon and evening, should be particularly alert for converging traffic from any forward position and, notwithstanding the rules of the air, be prepared to give way on the assumption that the pilot of the other aircraft cannot see you. ■



When your shadow falls behind you visibility may be difficult.



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IF you have ever sniffed disdainfully at checklists for inflight emergencies, consider the following case history:

". . . the propeller of the number four engine continued to windmill minutes after the engine died. The fire control mechanism was closed, shutting off oil and fuel to the engine. The co-pilot radioed he was endeavoring to feather the prop but the feathering circuit was unresponsive.

"The pilot was occupied with flying the airplane. Neither pilot registered any concern as the aircraft continued on course with only a slight loss in airspeed. There was a sharp noise as the windmilling prop, turning without oil, abruptly broke free and tore through the fuselage, severing the control linkage. The aircraft entered a steep dive, out of control, and crashed, killing all occupants . . . .

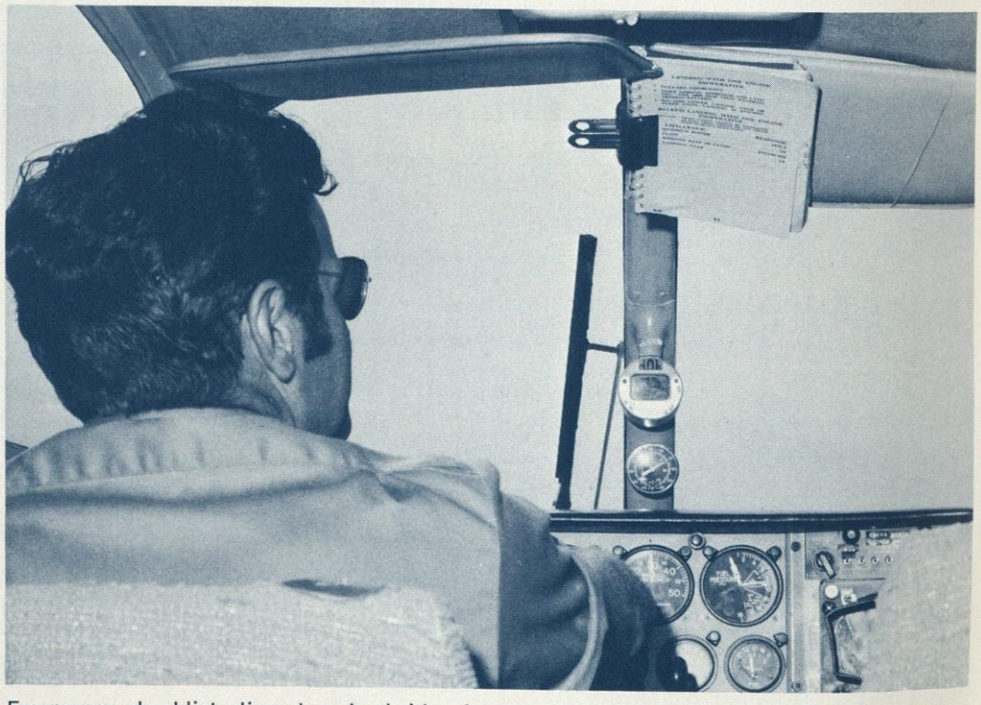
"Subsequent investigation located the engine-out checklist (with specific instructions for supplying oil to a windmilling prop) in the pilot's handbag, stowed in the baggage compartment. It was one of the few things that survived the crash."

No one who has not experienced an inflight emergency, large or small, can appreciate the effect of stress on the thinking—and acting—processes. In general, the less experience the pilot has, the greater his panic. Transmissions from some pilots in relatively minor emergencies—partial radio failure, rough running engines—recorded at control towers or flight service stations occasionally reveal virtual hysteria in the cockpit. Inability to locate switches or instruments in plain view on the panel is common in such cases.

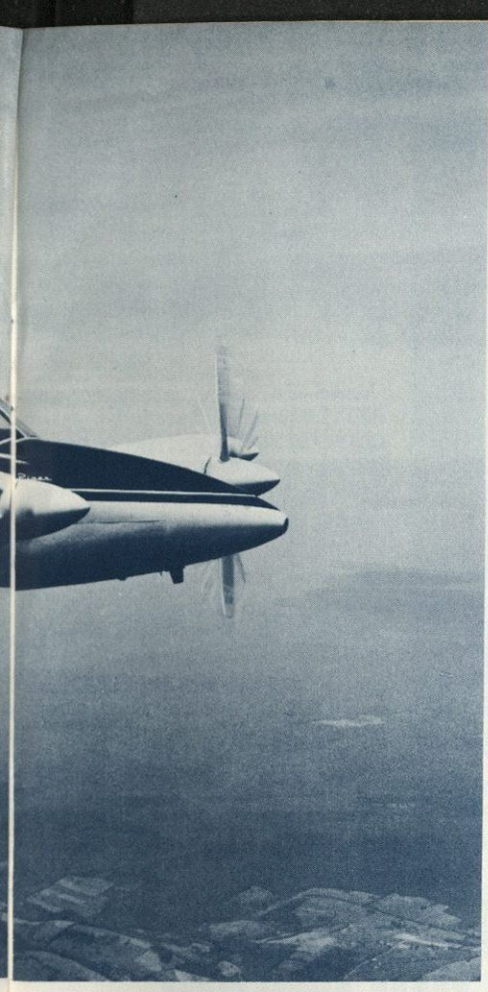
Tension Disrupts Memory

Regardless of whether the pilot apparently loses or keeps his cool, the fact remains that relying on memory or experience alone to cope with the emergency is courting danger. Even where the inflight failure has been repeatedly faced in practice—which is seldom the case with non-professional pilots—the tension of dealing with an actual crisis may be enough to disrupt the normal processes of thought and recollection. Emergency conditions have caused veteran pilots to omit such obvious procedures as lowering the landing gear. In a recent instance, a KC-135 was landed wheels-up, causing extensive unnecessary damage.

The danger of omitting an important procedure—or following a wrong one—during an emergency is greatest when the airplane is not privately owned, but rented or borrowed. Procedures vary so much from one aircraft to another, and from one year to another, that it is impossible to generalize or rely on any one particular series of steps



Emergency checklist clipped on backside of a sun visor or other handy storage place may be a lifesaver when fast reaction is needed. Print should be large, instructions concise.



Dealing with a windmilling prop on a dead engine is a step by step procedure that varies with each aircraft.

In an emergency, a checklist in hand outweighs an educated guess.

when the inflight emergency occurs. In some aircraft, for example, shutting off the fire control will automatically allow oil to reach the dead engine as long as the propeller is windmilling, but in others this is obviously not true.

Given the complexity of modern aircraft, the only safe procedure is to have available and use specific checklists for the major types of inflight failures. The checklists should be typewritten or printed in clearly visible type, easily readable at night as well as in daylight, protected with a plastic covering, and located where they can be reached immediately. Some pilots clip their checklists to the back of the sun visor, so that when the visor is flipped down the list can be read off without losing sight of the horizon or the terrain below.

A typical Owner's Handbook will contain half a dozen step-by-step procedures for inflight emergencies, such as engine restart, feathering an engine, unfeathering, closing a cabin door, auxiliary landing gear extension, avionics failure, etc.

The modern light plane engine is not prone to inflight failure; the most common cause is fuel starvation, from a variety of reasons which frequently may be easily remedied, assuming that the tanks are not actually dry. The average single engine aircraft will give the pilot about two minutes of gliding time for each 1,000 feet of altitude he has, assuming he immediately establishes his most favorable angle of descent. This is normally ample time to go through the re-start procedure, while at the same time preparing for an emergency landing.

Safety in Orderly Procedure

It is vitally important that the pilot take the time and trouble to go through the entire re-start procedure, as recommended by the manufacturer, without hastily skipping any of the steps. If the engine has failed because the pilot mistakenly pulled out the mixture control instead of the carburetor heat knob, or because he has failed to switch fuel tank selectors properly, it will do him little good to crank the engine frantically or over-prime it. A little practice in running through the re-start procedure, with an instructor in the right-hand seat, will shorten the time required and sharpen the pilot's response to this type of emergency. He may be surprised to learn that not all fuel tank selectors are arranged to read "L," "M," "R," but that some read "M," "L," "R." The experience may save him an occasional bent propeller or bruised wallet.

Loss of an engine in a twin must be responded to the instant it occurs. Some pilots rely on pat phrases (*dead foot, dead engine*) to remind them of the appropriate action. Where split seconds are critical, the right procedure must be in the pilot's mind, inculcated there by regular practice with an instructor onboard. The time to refer to the emergency checklist is *after* the aircraft has been stabilized in flight.

Hydraulic failure in general aviation aircraft is a principal concern in landing, since it means that retractable landing gear will have to be lowered by auxiliary means. Power failure in single-engine aircraft also means hydraulic and generator failure. In most light twins, failure of the left engine, which generally drives the hydraulic pump and generator, produces the same effect. Familiarity with and immediate access to your aircraft's checklist for emergency landing gear procedures is a must. Auxiliary systems are many and varied. The location of knobs and switches is almost infinite. Much valuable time and attention can be lost in sweating over a hand pump when compressed air or other emergency power sources are available.

Inexperienced pilots should also be aware of the fact that there are times when it is not advisable to attempt an engine re-start. Most engine failures result from fuel starvation, and the failure is usually proceeded by a slowing down of the engine, and a drop in rpm or manifold pressure. But if the engine suddenly develops a violent operation, or seizes, snapping the propeller to an abrupt halt, or if there is a sudden and dramatic loss of oil pressure (indicating a major leak), no attempt should be made to keep the engine running. To do so would be to invite the possibility of fire or total destruction of the engine, including wrenching it free of its mounting.

A muti-engine aircraft affords greater safety than a single-engine craft—provided that the pilot is fully capable of handling an engine-out situation. Cases are not uncommon where the pilot of a light twin, experiencing an engine failure for the first time, has been flipped on his back, with serious consequences, because of his inability to respond properly and immediately to the situation.

Keep Check List Handy

A partial or complete radio failure is a situation where ample time is available for consulting a checklist—unless, of course, it occurs at a critical point during an instrument approach or departure in bad weather. Procedures for radio failure emergencies are detailed in Part 1 of the Airman's Information Manual. Appropriate steps for apprising air traffic control of the condition may be abstracted from the AIM and posted as checklist.

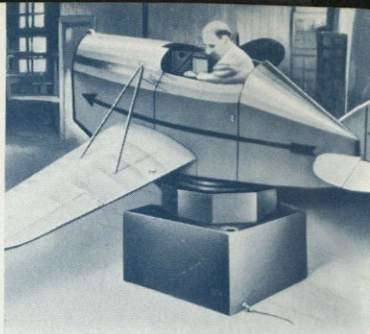
Although emergencies vary greatly as to kind and degree of hazard, most of them create a situation which should be responded to in three phases, *in this order*: 1, Establish control of the airplane. 2, Respond directly to the emergency on the basis of proper training. 3, Complete the emergency procedure with step by step rundown of checklist approved by manufacturer.

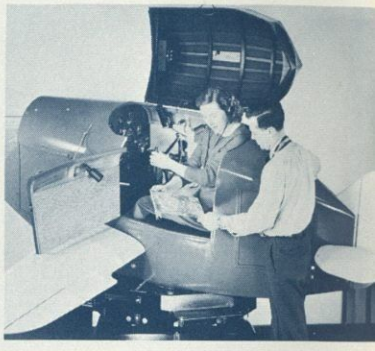
Checklists are not intended as a substitute for current experience and common sense in the cockpit. In point of fact, serious emergencies are rare, and the assistance of air traffic control is usually available. However, in view of the increasing sophistication of modern aircraft, and the unpredictable effect of emergency stress on a pilot, the existence of a cluster of checklists clipped to the sun visor, or contained in a scroll type of holder permanently fastened in the cockpit can be a steadying influence in time of need, and occasionally a life saver. ■

Famous

FLIGHTS

Edwin A. Link helps Marion Clayton, whom he later married, board his Cessna C-1 during his barnstorming days when he struggled to develop and sell his famed trainer.





Above—Ed Link putting original "Pilot Maker" through its paces in piano factory where it was developed. Below—Link trainer of type that trained thousands of WW II pilots.

Ed Link's PLYWOOD Pilot Maker

A low ceiling had closed in Newark Airport that morning, as fog swirled in from the New Jersey marshes. Inside the hangar, a group of Air Corps officers and civilian aircraft technicians had gathered to witness a historical aeronautical demonstration which was destined to revolutionize flight training, despite the fact that the demonstrator would never leave the ground.

The day was Tuesday, February 20, 1934—one day after the Army Air Corps had begun flying the mail. Only 11 days earlier President Franklin D. Roosevelt had summoned Major General Benjamin D. Foulois, Chief of the Army Air Corps, and asked the small, peppery general, "Can your Air Corps fly the mail?"

It was more of an order than a question, and Foulois gave the expected response. "Yes, Sir, Mr. President."

Of the 200 Air Corps pilots assigned to fly the mail, only two had more than 50 hours of flying time. While there were exceptions, the average Air Corps pilot had only five hours of instrument time under the hood and none at all under actual instrument flight conditions. Few pilots could operate the crude radios of the day, and there were only a few scattered ground radio stations.

On the first day the Army flew the mail, it suffered three fatalities and one gravely injured pilot. All of the accidents involved weather, and the problem was sadly clear: how could pilots unfamiliar with instrument flight learn to fly in all kinds of weather overnight?

In the hope of solving this problem, the Air Corps had dispatched a group of experts, under Brig. Gen. Oscar Westover, to witness the demonstration of a device designed to reduce the normal weeks required for instrument training to hours.

Inside the frigid, dimly lit Newark hangar General Westover and his staff were gaping at the oddest looking "aircraft" they had ever seen. Miniature wings and tail surfaces sprouted from a stubby fuselage and the unit was mounted on a pneumatic bellows which not only permitted it to move in a full 360° horizontal plane, but also to yaw, pitch and roll.

The cockpit, which could be completely covered by a domed hatch to cut the pilot off from all outside visual references, contained flight controls and a panel equipped with airspeed indicator, compass, turn and bank indicator, barometric altimeter. Pressure on the stick or rudder pedals would cause the "aircraft" to respond like a real plane. Mishandled, it could even "crash."

The inventor of this "pilot-maker," Edwin A. Link, had promised to fly down from his small flying school and factory in Cortland, N.Y. to demonstrate how his odd-looking invention could save the Air Corps precious hours of training time. Link had been trying to sell his invention to the Air Corps for several years, but no one in the War Department was willing to pay good American cash for an airplane that would not even fly. But now the urgency of the crisis brought on by the abruptly militarized air mail service provided Link with interested, if still skeptical, listeners.

The weather worsened as the morning wore on and General Westover and his staff, convinced that Link could never penetrate the fog surrounding the airport, debated returning to Washington.

Suddenly a plane was heard circling the field. The officers rushed outside and caught glimpses of a Cessna I as it broke out of a 300-foot ceiling.

Newark Airport had one of the few experimental "four-legged" radio courses in the country, and Link, with the aid of his few cockpit instruments, had been able to pick up the beam and follow it to Newark.

In reply to the question from the Air Corps group, "How did you ever do it?" he pointed to his clumsy-looking flight trainer, and proceeded to demonstrate how it could teach a pilot to rely on instruments rather than the seat of his pants.

General Westover promptly contracted with Link to train ten Air Corps pilots in instrument flying, using the Link trainer for almost all of the instruction. Impressed by the all-weather flying performance of these pilots, the Air Corps soon bought six trainers at $3,500 each. The era of the simulator was born on that foggy February morning in Newark.

Ed Link had begun tinkering with the idea of a flight simulator soon after he learned to fly in the mid-20s, when flight instruction cost from $25 to $50 per hour. He argued that the cost could be driven down within the grasp of the average man, provided there was some way *to fly without leaving the ground.*

With woodworking skills learned in his father's piano factory in Binghamton, N.Y., Ed Link hand-crafted his first trainer, dubbed the "Pilot Maker." It was substantially the same device he later sold to the Air Corps.

Although Link had no trouble demonstrating the workability of his flight simulator, he had no cash buyers. Link, who is now 65, recalls that during those lean days, he lived a "hamburger and hot dog existence" while operating a small pilot training school, repairing aircraft and doing odd jobs.

Using his "Pilot Maker" in his own flying school, Link was able to turn out qualified pilots for $85, about one-tenth of the going rate. Link taught his brother, George, to fly with only 42 minutes of actual aircraft flight

time, following a concentrated course in the "Pilot Maker."

Still the trainer did not sell and Link busied himself trying to scratch a living out of aviation. He became an airport manager, charter pilot, barnstormer and air show impresario. He invented an illuminated aerial sign and began contracting for commercial advertising in the sky.

The "fly-by-night" advertising venture prospered and became a mainstay in Link's struggling aviation enterprise—and it produced an unexpected dividend: of necessity he became an expert at night and instrument flight.

During World War II, Link's company turned out trainers at the rate of one every 45 minutes, with a peak payroll of 1,500 employees. All in all, some half-million pilots throughout the world have taken part of their flight training in Link's "blue box."

One of the company's latest products, the Link VAMP (Variable Anamorphic Motion Picture) is used to train Boeing 727 flight crews. The new system creates visual realism for simulated flight, takeoffs and landings in all types of weather. Cost—$250,000, a far cry from the $3,500 paid by the Air Corps for the first Link trainer.

The organization founded by Ed Link now helps America's astronauts train for lunar missions from blast off to actual moon landing and return to earth with specially built simulators. A Link company developed system made possible photographs of the Moon and Mars by converting signals from spacecraft probles into photographs. (Link's company affiliated with General Precision Equipment Corp. in 1954, and in 1968 became the Link Division of The Singer Company).

Although no longer active with the company, except as a consultant, Ed Link is still engaged in pioneering research.

His latest invention is a revolutionary underwater vehicle, the "Deep Diver," designed to allow divers to enter and depart a vessel at watery depths as low as 1,500 feet —quite an accomplishment for a man who started out with an organ bellows and a lot of determination. ■

Newest Link trainer. Boeing 727 simulator uses movie film to create realism.

BRIEFS

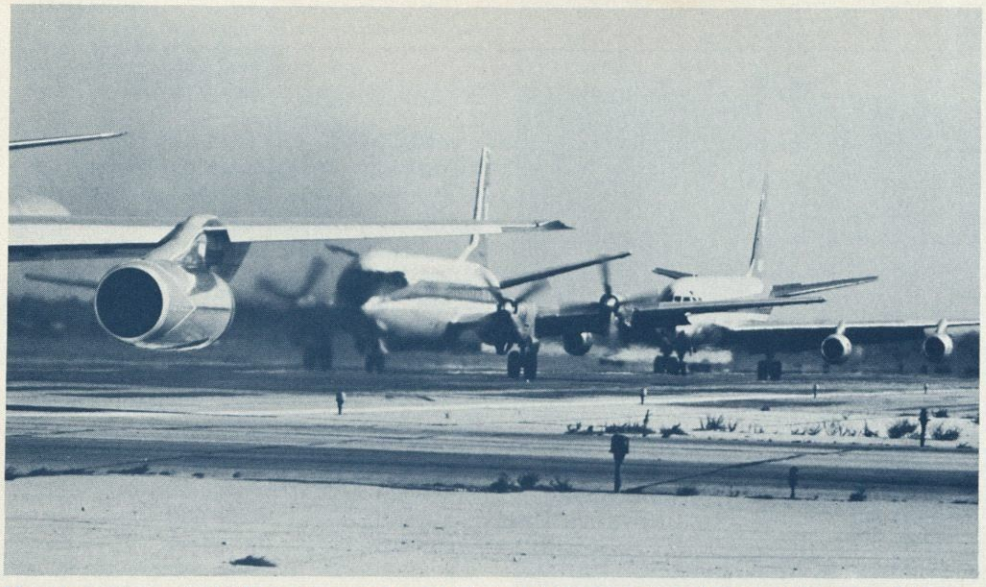
• STALLION STAMPEDE. FAA has completed airworthiness certification of the new Helio Stallion, an 8-to-11 place turboprop STOL. Production is now underway at the Helio factory at Bedford, Mass., with deliveries scheduled for later this year. Described as the fastest and largest STOL being made in the U.S., the Stallion can carry a useful load of 2,275 pounds, can take off under no-wind conditions with a full load after a ground roll of 320 feet, and can clear a 50-foot barrier 660 feet from the starting point. The Stallion's top speed is 217 mph, cruises at 160 mph, and has a full load normal cruising range of 640 miles. Service ceiling is 28,000 feet.

• A HANDY, NINE-PAGE LISTING OF ALL SCIENTIFIC AND TECHNICAL reports published in 1968 by FAA's Research and Development Service is available free of charge by writing to Federal Aviation Administration (RD-51), 800 Independence Ave., S.W., Washington, D.C. 20590. The reports were prepared by or for FAA in connection with various scientific and tchnical projects related to the National Airspace System and general aviation.

• MIDNIGHT, DECEMBER 31 is the deadline for submitting nominations for the 1969 National Aviation Mechanic Safety Awards Program, a government-industry-labor program to honor outstanding aviation mechanics. Now in its seventh year, the program offers mechanics in both general aviation and air carrier categories awards at the state, regional and national levels. Thousands of dollars worth of prizes will be presented to regional and state winners. Winning mechanics at the national level will be given all expense-paid trips to Washington for themselves and families. FAA Advisory Circular 60-2F, available from all FAA District Offices, contains contest rules and entry blanks.

• AIRCRAFT OWNERS' REACTIONS TO FAA PROPOSAL that aircraft registration certificates be revalidated each year is now being studied in Washington agency headquarters. Under the proposal, owners would be required to inform or verify to FAA once a year the following: owner's name, address, citizenship and whether aircraft is under foreign registry; aircraft make, model, registration and serial numbers; name and address of principal aircraft operator if not owner; make and model of aircraft engines; type of communications and NAVAIDS installed; airport where aircraft is based; and nature of use and hours flown (training, recreation, commercial, etc.)

• WATER-LOGGED TUNDRA, or almost any other geographical obstacle, presents no problems to oil prospectors working Alaska's North Slope when they take to the airways. The structure slung beneath the Sikorsky S-64E Skycrane is an all metal garage which weighs 12,500 pounds. Two Skycranes airlifted more than 1,000 tons of equipment, including a complete drilling rig, to the North Slope in nine days last summer.



How to relieve air traffic delays and nose-to-tail jam-ups at major air terminals (above—Kennedy Airport, N.Y.) are among the topics covered in new airport congestion study.

NEW PROGRAMS FOR RELIEVING AIRPORT CONGESTION

The causes and recommended remedies for curing congestion at 18 of the nation's busiest airports is the subject of a new publication prepared by a special FAA task force.

The report focuses on short and medium range construction projects—those requiring one to four years to complete—which could relieve congestion by increasing the operational capacities of these airports.

Airports discussed in the report are: Atlanta; Logan International, Boston; O'Hare International, Chicago; Cleveland Hopkins International; Stapleton International, Denver; McCarran International, Las Vegas; Los Angeles International; Memphis Metropolitan; Miami International; J.F.K. International; Laguardia and Newark; Oakland International; Philadelphia International; Lambert-St. Louis Municipal; San Francisco International; Puerto Rico International; and Seattle-Tacoma International.

The report—"A suggested Action Program for the Relief of Airfield Congestion at Selected Airports," (AD 689 107) is available at $3 a copy from the Clearinghouse for Federal Scientific and Technical Information (CFSTI), Springfield, Va. 22151. Orders should indicate the publication title and the "AD" number and include a check or money order made payable to CFSTI.

Crash Survivability of Air Carrier Aircraft Upgraded

Stronger passenger seats and seat attachments, increased protection for fuel systems, stronger, more fire resistant cargo and baggage compartments, and a means of containment for all unattached items are among a long list of improvements recommended in a proposed rule now under study by FAA.

The proposal also asks for readily understandable passenger information signs, larger overwing exits (from the present 19″ x 26″ to 20″ x 36″), establishment of standards for wide, slip-resistant escape routes from overwing exits, and automatic deployment of "assist" means to the ground where the escape route ends six or more feet from the ground.

New and improved fire protection are asked for in the proposal, along with a requirement upgrading emergency lighting systems. Better safety belts, individual flotation devices, and a requirement that occupants with shoulder harness fasten the harness on takeoff and landing are recommended.

There is also a requirement for a means to prevent serving trays, galley equipment and crew baggage from shifting under certain conditions. Tableware and food trays would also have to be stowed on takeoff and landing.

Looking into the Future of ATC

FAA recently awarded two separate contracts totaling $201,757 for a long-range look at the capacity of the air traffic control system and anticipated demand. The agency will use the results of the studies to plan air traffic control system improvements.

Stanford Research Institute, Menlo Park, Calif., was awarded a contract for $103,915 and Arthur D. Little, Inc., Cambridge, Mass., received a contract for $97,842, for a one-year study program.

Tobacco Fume Effect on Air Travelers Subject of Year-long Federal Study

Tobacco smoke and its effects on air passengers is the subject of a lengthy study which will be carried out by FAA's Office of Aviation Medicine in cooperation with the Department of Health, Education and Welfare and the Air Force.

The "laboratory" will be civil passenger aircraft under contract to the Air Force and the subjects will be military personnel and their dependents. Such flights are generally of long duration and fully occupied.

The amounts of carbon monoxide and other impurities in both passenger compartments and cabin areas will be studied. Smoker and non-smoker volunteers among the passengers will be asked to supply samples of blood and expirated air before and immediately following flight.

A report is planned for 1970.

International Air Rules Available

Copies of the International Rules of the Air are now available at some 350 FAA field facilities for examination by pilots planning flights outside the country.

Copies of the rules have been placed in all FAA flight service stations, international flight service stations, and combined station/towers.

Pilots flying American registry aircraft over the ocean, or over any of the 100 nations that are signatories of the International Civil Aviation Convention, are required to abide by the International Rules of the Air.

FRISKY OLDTIMER—this Consolidated PT-3, built in 1926, is now a prime exhibit in San Diego's Aero-Space Museum following a recent 1,600-mile cross country flight from Little Rock, Ark., to the West Coast. With five stops enroute, the trip took 25 flying hours, at an average speed of 70 mph. The PT-3 was the aerial classroom where hundreds of pilots destined to make Air Force history first learned to coordinate stick and rudder.

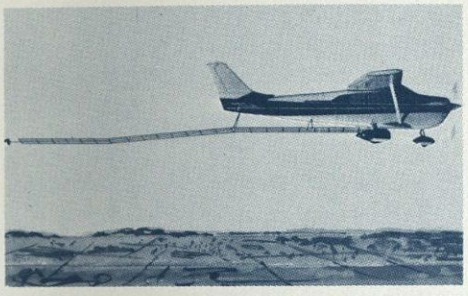
• Banners Flying

In the Forum of your July 1969 issue, you reprinted an inquiry for an illuminated banner, from Mr. M. S. Sheikh of W. Pakistan.

Please be advised that I can produce a light, night-use, moving message banner that will handle up to 20 or 30 words.

This sign has FAA approval and is flown on a Cessna 172 Skyhawk based in Pueblo, Colo.

Don A. Grace
Colorado Aero-Ads
616 E. 4th St.
Pueblo, Colo. 81001



• Right Plane, Wrong Model

"Call Us Anytime," the "save" article in the June *FAA Aviation News,* made good reading and taught an important safety lesson but for me it is a flaw—the story involved a Stinson "Station Wagon," Model series 108, but the photo used to illustrate the article showed a Stinson Model HW-75.

Burton Kemp
Chicago, Ill.

Reader Kemp is right, as befits an astute aviation publicist and photographer, which he is.

• Knowledge is Power

I recently received the Government Printing Office price list on aviation subjects and was disappointed at the few advanced texts offered. The Navy and Air Force must use many excellent texts in their pilot training programs.

Are these available to the public? Also, is there one source where one can obtain a complete listing of all text books published on aviation.

Vernon R. Boltz
Oakland, Calif.

Many military aviation textbooks are available to the public through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Ask for price list Nr. 79.

A listing of commercially printed aviation textbooks is found in "Books in Print" which is available at booksellers and in public libraries.

• Airport Manager is the Boss

We have six air carrier flights and approximately 40 to 60 private operations per day, daylight to dark, at our airfield in central Minnesota.

We have had numerous complaints from large and small aircraft having to make go-arounds because of glider operations. They want us to bar the glider people.

The gliding enthusiasts, however, don't see it that way, contending that we cannot restrict their activities at a field where Federal funds are involved.

Can you advise us?

John C. Riedl
Brainerd, Minn.

The Brainerd Airport has received Federal funds and is, therefore, subject to a grant agreement with the Federal government. This requires that the airport be open to all kinds and classes of aeronautical activity.

This does not mean that the airport owner may not impose regulations and restrictions governing the use of the airport to insure safety.

FAA does not consider it unreasonable for the airport owner to exclude such activities as glider operations, parachute jumping, banner towing, etc., where it can be reasonably demonstrated that such activities interfere with the safe and efficient use of the airport.

• Bearing Down on Us

Just a word to compliment you on your fine article on area navigation (From "Checkpoints to Waypoints") in the July *FAA Aviation News,* and to split another word.

The photo caption on page 4 uses "heading," when the right word is "bearing." A heading, as such, is never what is inserted into the OMNI bearing selector.

H. T. Headley
New York, N.Y.

Right. The pilot would fly a "heading"—which would include wind correction—in order to make good his "track" along the "bearing" to the waypoint or VOR.

• High and Dry

Has FAA ever published anything on the effects of alcohol, particularly on the brain, as opposed to its effect on other organs of the body?

Samuel J. Shook
Oakdale, Penna.

Several experiments have been done by FAA's Civil Aeromedical Institute on the effects of alcohol on performance, but it has not been found or stated in the published reports that alcohol affects brain functions differently from those of other organs of the body.

The FAA pamphlet, "Alcohol and Flying Don't Mix," discusses drinking and aviation. It is available free of charge from the Chief, Aeromedical Education, AC-140, Civil Aeromedical Institute, P. O. Box 25082, Oklahoma City, Okla. 73125.

• Who Pays?

After reading your article in the July issue about the "Aviation Facilities Expansion Act of 1969," I thought maybe your people could help me understand just how the airlines are going to pay their fair share of this program if they are exempt from the fuel taxes. I don't consider passenger ticket and freight tax increases as coming out of the airlines' pocket!

Vernon D. Rauch
Heath, Ohio

The new revenues for improved air service would come from taxes from individuals who benefit from our airport/airways system, As far as commercial air travel is concerned, this means the passenger who travels on the airline, not the carrier. Any tax on airline fuel would be passed on to the passenger as a fare increase, justified by increased operating costs. It is felt that a direct tax on the ticket would be the most efficient means of collecting revenue. Since the fare system of airlines is geared to the profit ratio (by Federal law), there is no available means of taxing airlines without having this tax passed on to the passenger.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

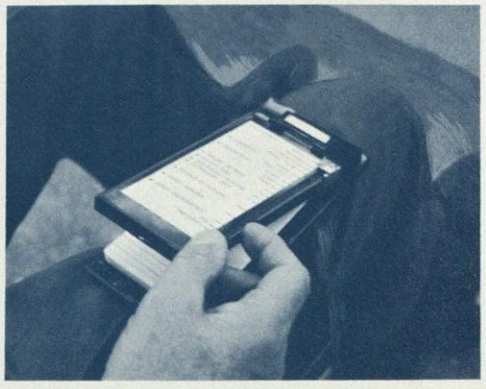
• Instant Fact Finder

An ordinary desk type telephone list finder, available at any stationery store, makes an inexpensive handy fact file for information a pilot might need in a hurry. It reinforces the memory, takes up little space, and is easy to set up for personal needs. A home-made sheet metal clip enables it to be fastened to a leg.

For what it's worth, my list finder is organized as follows: (1) all the standard checklists for my plane; (2) sketches of the runway and taxiway layouts at local airports, with elevation, radio frequencies and other field information; (3) the most often used radio frequencies, with emergency frequencies in heavy lines; (4) aircraft information such as allowable loads, fuel and oil capacities, weights etc.

One final suggestion: get the most rugged list finder available.

Robert A. Randall
Albuquerque, N. M.



• Seeks Data on Early Birdman

As others have in the past, I am turning to FAA AVIATION NEWS for assistance in gathering material on aviation pioneer Charles Jasper Glidden, who was active in aviation just after the turn of the century. I am in the process of researching Mr. Glidden in preparation of a biography on this early airman.

If any of your readers know anything about Mr. Gildden, or can suggest sources of information on him, there's an enthusiastic writer waiting to hear from them. Please send any and all leads to the undersigned.

Mrs. Hazel L. Bartlett
1067 Norman Court
Long Beach, Calif. 90813

• Who Was First?

Your continuing series "Famous Flights" is an entertaining and instructive feature. While reading the account of the flight of the NC-4, "Nancy Four was Number One" in the *July FAA Aviation News* I thought of a brain teaser for your readers.

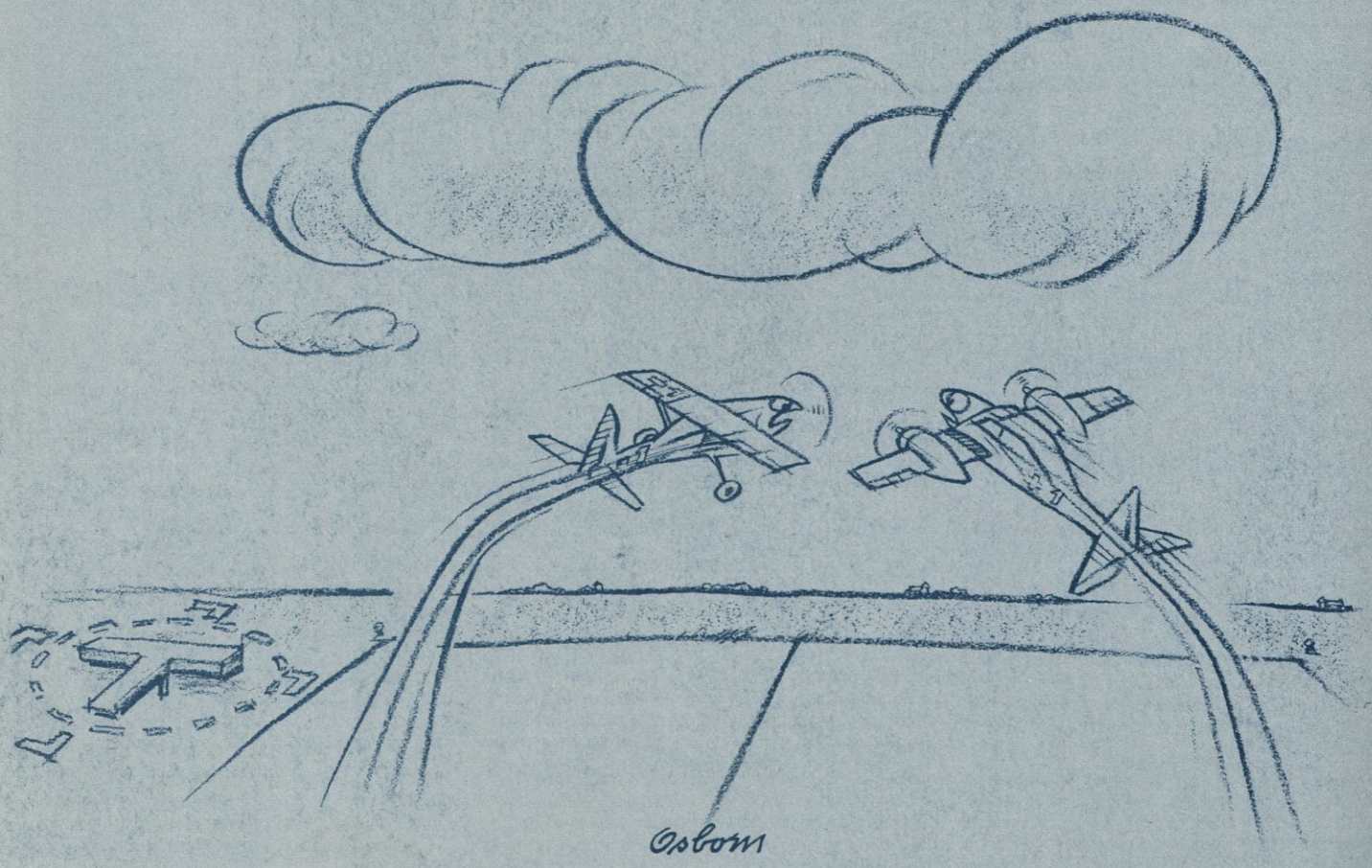
It is this: Who was the first man to arrive in America by air from Europe and when? In what aerial vehicle did he arrive?

I'd say that out of 1,000 people, 999 would not know.

G. A. C.
England

AVN NOV
ARTHUR A CARTER JR
2145 N PIERCE ST, APT 7
ARLINGTON VA 22209

Traffic left? Traffic right?



Watch the "T" and Save a fright.

Suggested by R. L. Horton, Paso Robles, Calif.